

4. THE FUNCTION OF EXTERNAL GLANDS IN MAMMALS

A short note in *Nature* **193** (4817) : 799, of 24 February 1962, entitled 'Territorial Function of Chin Gland Secretion in the Rabbit, *Oryctolagus cuniculus* (L.)' by R. Mykytowycz, describes these animals in an enclosure as marking posts, grass, branches, edges of burrow entrances, walls and ceilings of cages, and even kittens and does during amatory behaviour with small amounts of the secretion. It is suggested that 'territorial marking is of value among gregarious species by advertising that the area is at present occupied and thus minimizing aggressive fighting'. Chin glands were found to be less developed in the hare, *Lepus europaeus* Pallas, which has a much larger home-range than the rabbit.

These observations are of interest as many of the larger wild mammals in India, e.g. sheep, goats, antelope, deer, etc., have prominent glands (infra-orbital, inter-digital, inguinal, etc.) whose function and significance still remains to be discovered.

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EDITORS

5. ARE DOMESTIC ANIMALS OVERGRAZING THE
KEOLADEO GHANA SANCTUARY IN RAJASTHAN?

(With two plates)

The seven-thousand acre Keoladeo Ghana Sanctuary is located near Bharatpur, north-eastern Rajasthan, about 100 miles south of New Delhi.

In late February 1962, I made a brief three-day visit to the sanctuary to photograph birds and add new species to my life list. The highlight of the 94 species identified was the thrill of seeing three Siberian Cranes (*Grus leucogeranus*), scarce winter visitors to India from North Asia. But the buffaloes, which are permitted to graze in the water on aquatic plants, frightened them off before I could photograph them.

Which brings me to the reason for writing this note—the livestock. The Range Officer at the sanctuary informed me that there

are some 20,000 head of cattle (both cows and buffaloes) that daily, and throughout the year, graze in the sanctuary. Some of the effects of this grazing could be seen immediately. I can only imagine other effects which I did not have the time to examine.

The level unflooded ground has been packed hard by the constant trampling of thousands of heavy hoofs. There is very little understorey — young trees and shrubs necessary for reproduction — in the thorn forest. As a result, there probably will be slow replacement of the natural vegetation. (Plate II, 1)

In addition to wildfowl and waterbirds, the Keoladeo Ghana Sanctuary also harbours herds of cheetal, black buck, pig, and an occasional panther.

Depending on the food habits of the animals that live in the sanctuary, there may be competition for food — interspecific competition between species, or intraspecific competition within a single species. For example, if cows and blackbuck both graze the same plants in the same area, then interspecific competition results, and one or both species suffer. Or, if the population of buffaloes is too great then there will be intraspecific competition among the buffaloes, again to the detriment of the competitors. However, if all the species feed on different plants in the same area, or feed in different areas entirely, and assuming a sufficient supply of food, then there will be no competition.

The question arises, therefore, can the range support all the animals? ('Range', as used in this paper, refers to an unfenced, naturally-vegetated area where livestock are permitted to forage freely for food.) To answer this a study of the food habits of the animals (do they graze or browse?) must be made, along with a determination of the favoured food plants and the carrying capacity of the range (the maximum number of animals the range can support).

However, regarding the present large population of livestock present in the sanctuary, I would like to adduce information from a study made in the United States.

The Keoladeo Ghana area receives an average of 27 inches of rainfall each year. In tropical India, this amount of precipitation is considered semi-arid. In an area receiving 25-30 inches of rainfall in the United States (a sub-humid condition in temperate North America), it was found that eight to 15 acres of range *in good condition* were required to support *each* cow for an entire year (Chapline & Cooperrider, 1941). In contrast, it appears that at the



A portion of the marshy Keoladeo Ghana Sanctuary: Waterfowl, waders, and fish-eating birds frequent the area in thousands. Buffaloes may be found grazing and wallowing in the shallow areas. Perched in the background are darters and cormorants, while egrets feed in the water.

(Photo : Julian P. Donahue)



Semi-arid thorn forest in Keoladeo Ghanat Sanctuary: Typical of the un-folded parts of the Sanctuary. In many places the trees are widely-spaced, and the ground is hard. The growth of grass is very sparse, and those which remain are probably of the less-palatable species.

(Photo : Julian P. Donahue)



An enclosure in Rajkot District, Gujarat: Within two years of the establishment of the enclosure the more favourable tall-grass food species have begun to dominate. Compare this with the area outside the enclosure, where excessive grazing has continued.

Photo taken in early July 1957, about two weeks after onset of monsoon.

(Courtesy of the photographer : Roy L. Donahue)

Ghana Sanctuary each cow receives about a third of an acre of range, or less than one-twentieth of the range required to properly maintain an American cow without damage to either the range or the cow. Because of the difference between the North American and Indian situations, and also because these figures include the flooded as well as the unflooded portions of the Ghana, it is difficult to draw a satisfactory conclusion. However, it does appear that either the Indian cow and buffalo can thrive on a fraction of the food required by an American cow (which I do not believe) or that the range is being overgrazed.

Briefly, this is what happens when a range is overgrazed. When the vegetation is at its peak luxuriance (during the monsoon, in this case) there is usually sufficient food for a normal number of cattle. However, the cattle tend to choose the more palatable species as they graze, and shun the undesirable species. As a result, the choice food species are damaged so much by constant grazing pressure that they frequently fail to produce seed, which is vital to maintain natural revegetation. Only after the choice species have been grazed off do the cattle begin to put any pressure on the less palatable species which, by this time, may have produced seed. As a net result of this process, the less palatable species tend to multiply. The most palatable of these remaining plants are then eaten first and damaged, which encourages the even more unpalatable species. The process, one can see, is a vicious circle that, year by year, encourages the production of more and more weeds (Sampson, 1952).

If I understand correctly, the high livestock population of the Ghana is maintained throughout the year. This situation is largely a result of the protection of cattle by religious sentiment which, in India, complicates range-management greatly. When the range deteriorates in beef-eating countries, the cattle population is reduced to a level that the range can safely support. At the present time this cannot be done in India, and the cattle graze throughout the year. In a situation like this, unregulated and constant grazing is one of the most harmful methods that can be used. There are several systems of controlled, rotated, or regulated grazing that would be much more productive, both in terms of improvement of the range and more food for cattle (Sampson, 1952).

Unfortunately, there are other complicating factors involved, which I can only mention. The solution of these will have to be sought by those more qualified than I.

The buffaloes spend a large part of the day grazing on water